National Aeronautics and Space Administration

NASA's Space Launch System:
A Flagship for Exploration Beyond Earth's Orbit

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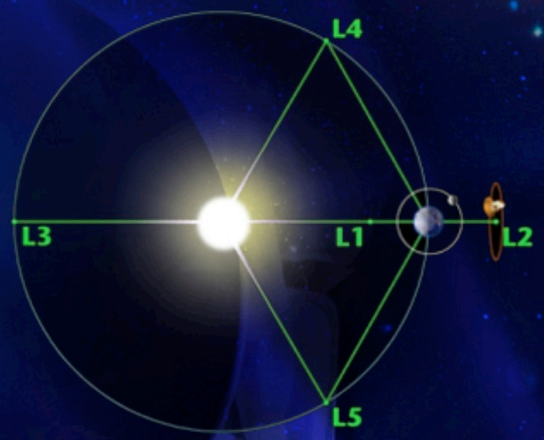
October 2012

“To reach for new heights...

and reveal the unknown so that what we do and learn will benefit all humankind.”

National Aeronautics and Space Administration

NASA



Beyond Earth Orbit Science and Exploration

- Extend and sustain human activities across the solar system.
- Expand scientific understanding of the Earth and the universe in which we live.

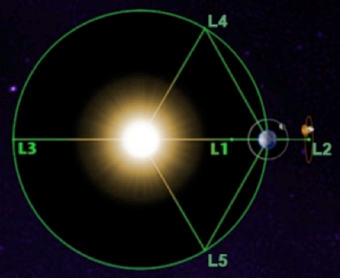
NASA 2011 Strategic Plan

The Future of Exploration

"This expanded role for the private sector will free up more of NASA's resources to do what NASA does best — tackle the most demanding technological challenges in space, including those of *human space flight beyond low-Earth orbit.*"

— John P. Holdren, Science and Technology Assistant to the President
The White House, May 22, 2012

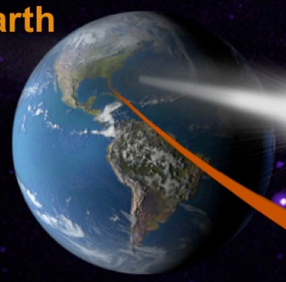
International Space Station
286 mi / 460 km



Lagrangian Point L2
274,000 mi / 440,960 km

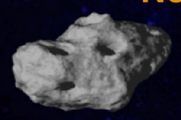
Mars
34,600,000 mi / 55,700,000 km

Earth



Moon
238,855 mi / 384,400 km

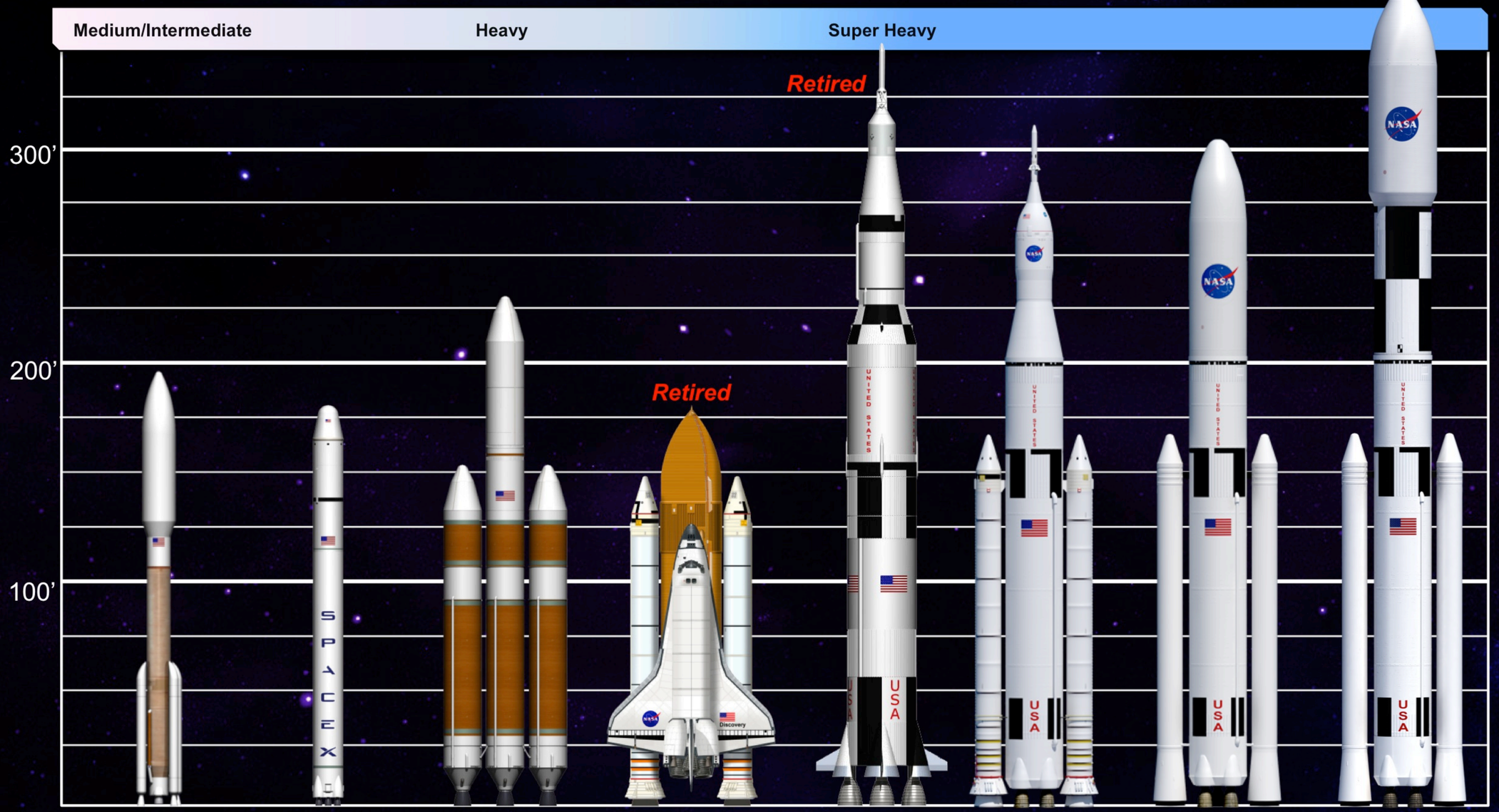
Near-Earth Asteroid
3,106,866 mi / 5,000,000 km

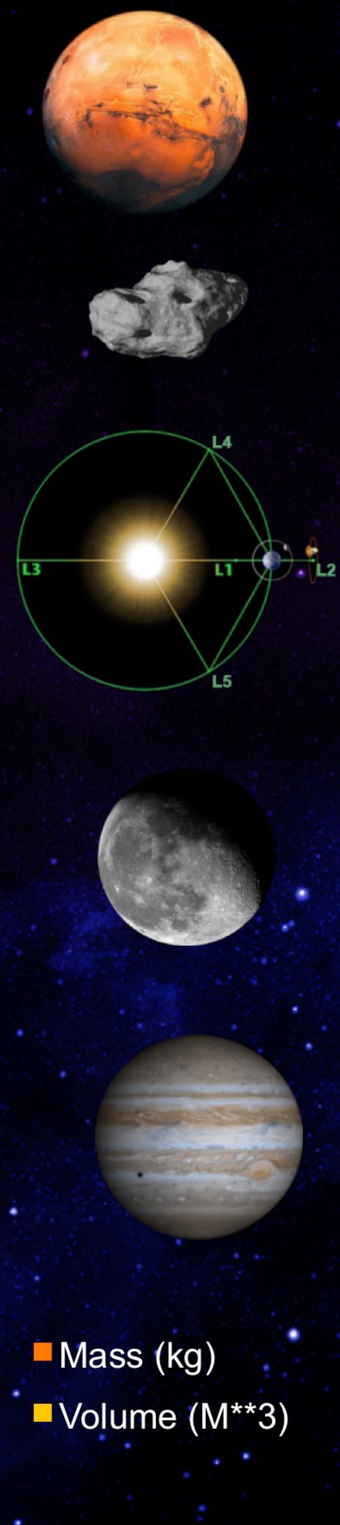


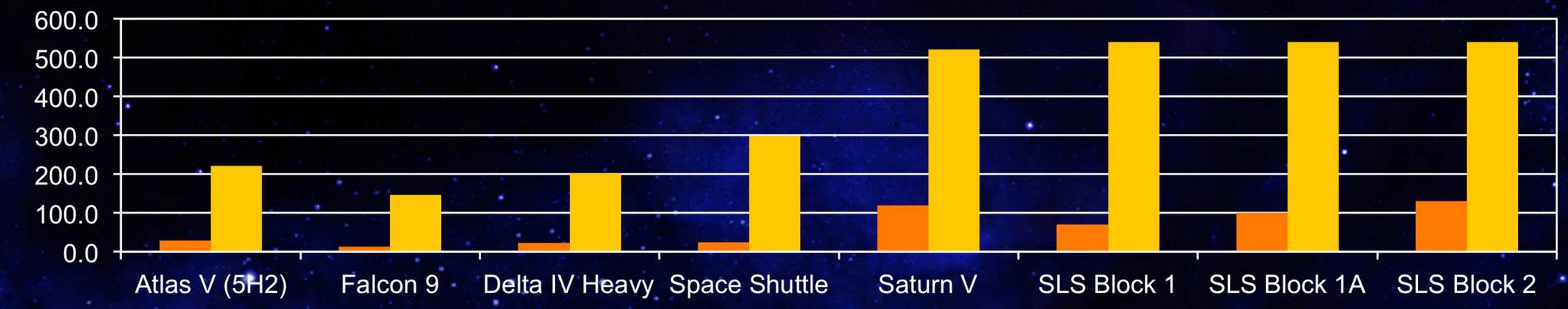
"My desire is to work more closely with the human spaceflight program so we can take advantage of synergy. We think of the SLS as the human spaceflight program, but it could be hugely enabling for science."

— John Grunsfeld, Associate Administrator
NASA Science Mission Directorate
Nature, Jan 19, 2012

Most Capable U.S. Launch Vehicle

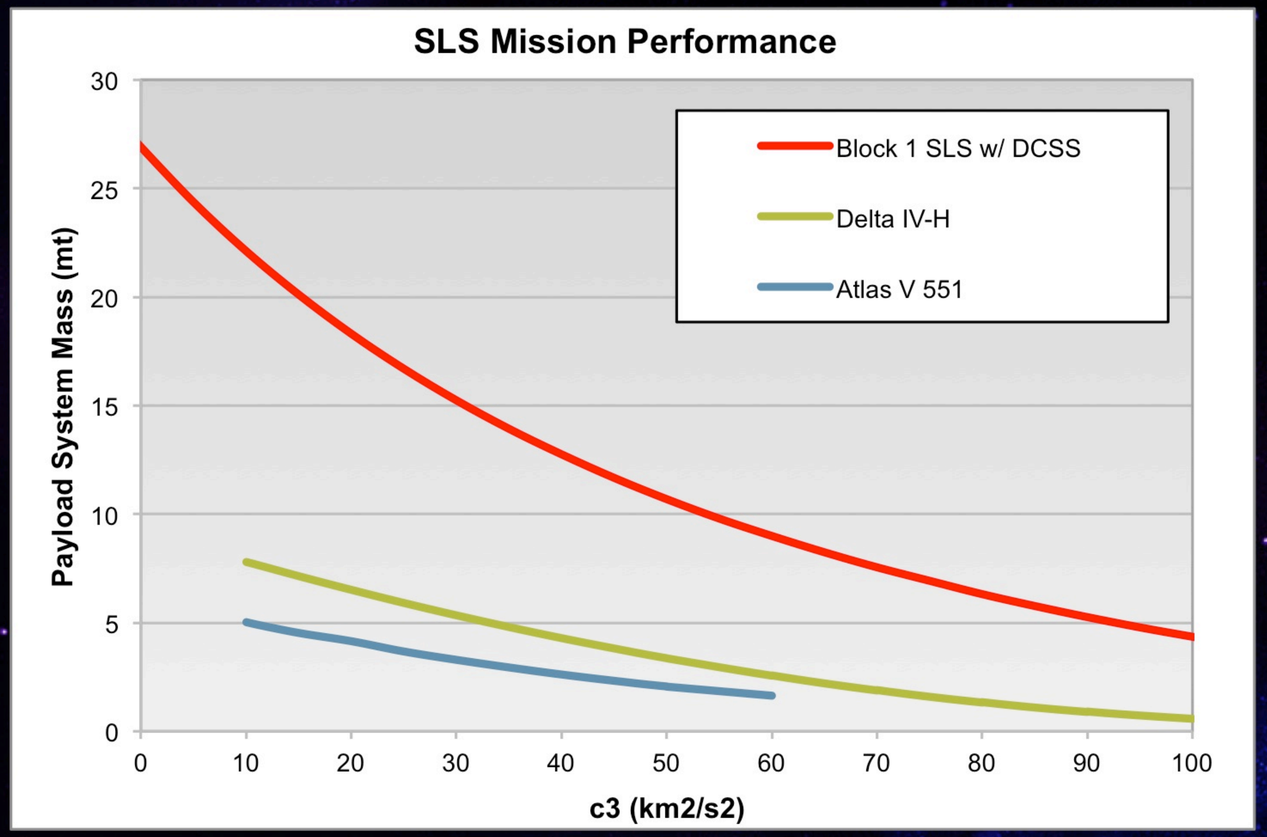


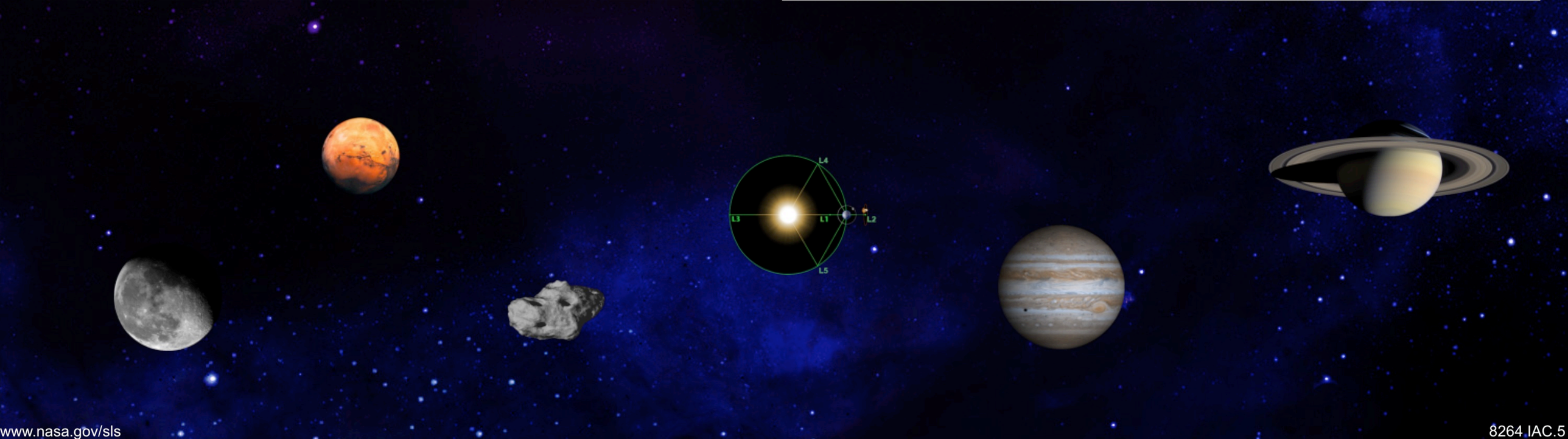




SLS Benefits

Attributes	Outcomes
• Greater volume and mass capability/margin	• Increased design simplicity • Fewer origami-type payload designs needed to fit in the fairing
• Single launch of multiple elements • Fewer launches and deployments • Fewer critical operations	• Increased mission reliability and confidence • Less risk
• High-energy orbit • Shorter trip times	• Less expensive mission operations
• Increased lift capacity • Increased payload margin	• Less Risk





SLS: Safe, Affordable, and Sustainable

INITIAL CAPABILITY, 2017–21

70 t
321 ft

Orion Multi-Purpose Crew Vehicle (MPCV)
- *Lockheed Martin*

Launch Abort System

Interim Cryogenic Propulsion Stage
- Allows early flight certification for Orion
- Flexible for a range of payloads
- *Boeing*

Core/Upper Stage
- Common design, materials, & manufacturing
- *Boeing*

Avionics
- Builds on proven EELV software
- *Boeing*

5-Segment Solid Rocket Boosters
- Upgrading Shuttle heritage hardware
- *ATK*

Evolutionary Path to Future Capabilities
- **Minimizes unique configurations**
- **Allows incremental development**
- ***Advanced Development contracts to be awarded in FY13***

EVOLVED CAPABILITY, Post-2021

130 t
384 ft

Fairings (27.5’ or 33’)
- Right-sized for the payload
- In-house design
- *Full-and-open competition FY13*

J-2X Upper Stage Engine
- Builds on Apollo Saturn J-2 heritage
- *Pratt & Whitney Rocketdyne*

Advanced Boosters
- Competitive opportunities for affordable upgrades
- *Risk-reduction contracts to be awarded in FY13*

RS-25

Core Stage Engines
- Using Space Shuttle Main Engine inventory assets
- Building on the U.S. state of the art in liquid oxygen/hydrogen
- ***Initial missions: Pratt & Whitney Rocketdyne***
- ***Future missions: Agency is determining acquisition strategy***

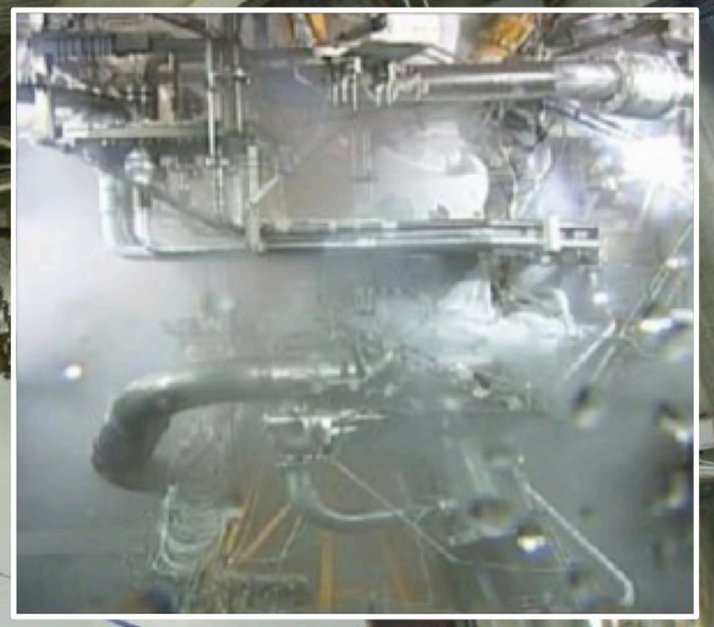
A Platform for Global Cooperation

5-Segment Solid Rocket Booster

Qualification Motor Casting, July 2012

Development Motor Test 3
September 8, 2011
ATK Promontory, Utah

J-2X Upper Stage Engine



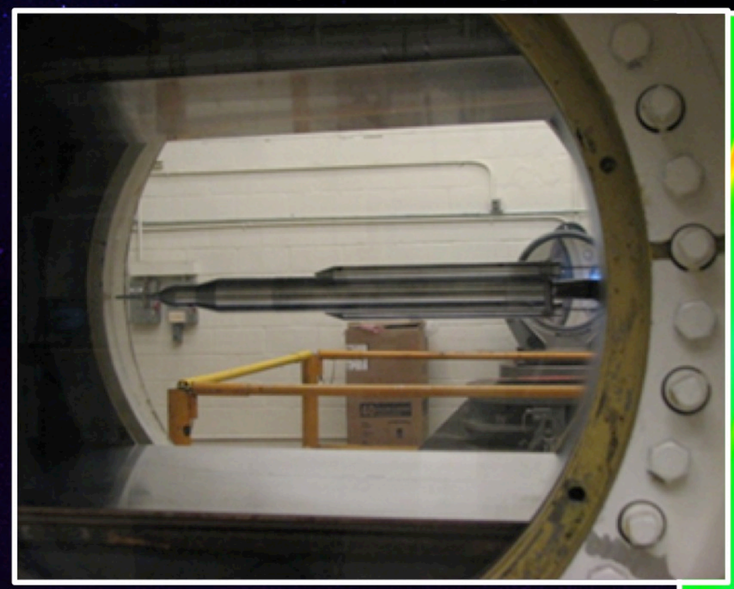
First J-2X development engine on the A-2 Test Stand at Stennis Space Center April 20, 2012

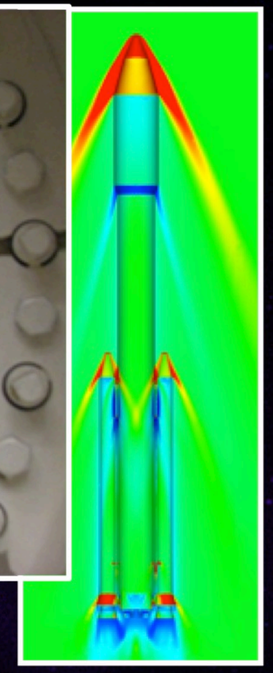
SLS: Preparing for First Flight in 2017

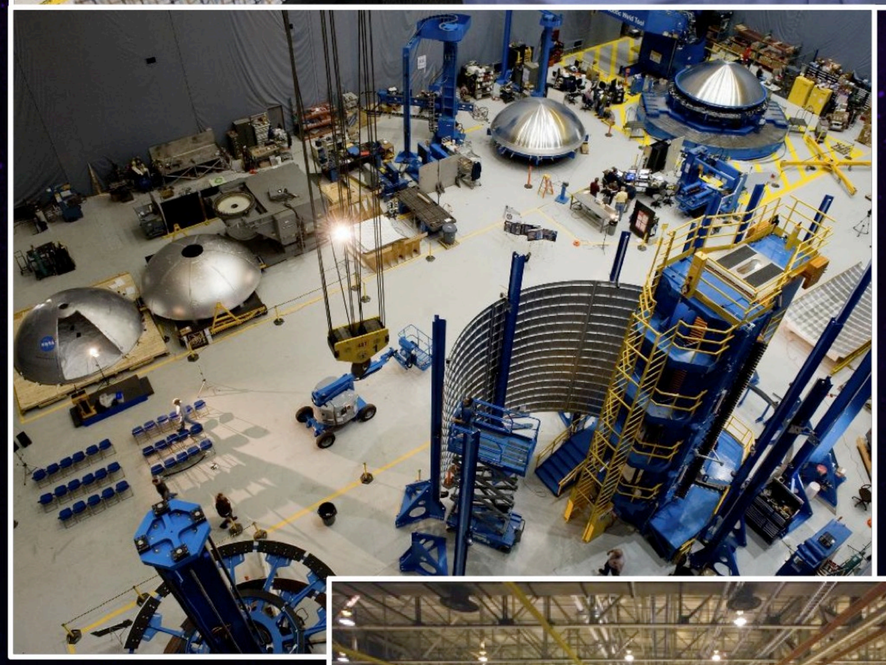
Avionics Test-Bed
May 2012

Systems Engineering & Integration

Force and moment wind Tunnel testing
July 2012

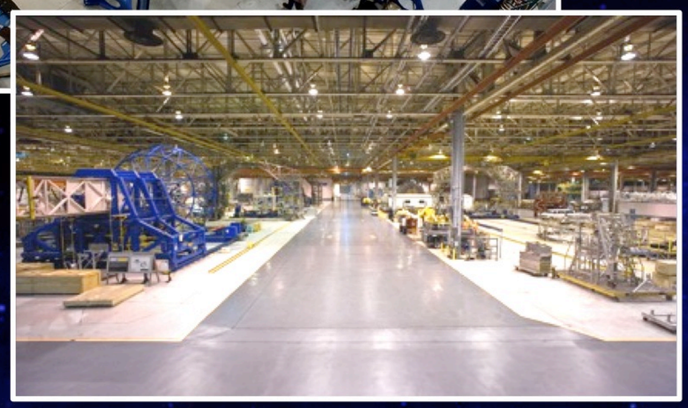






Ring Milling for Multi-Purpose Crew Vehicle-to-Stage Adapter (MSA) for 2014 Exploration Flight Test
June 2012

MSA Pathfinder hardware
June 2012



Stages manufacturing demos and tooling preparation for friction stir welding
April 2012

For More Information

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Somewhere, something incredible is waiting to be known.

— Carl Sagan